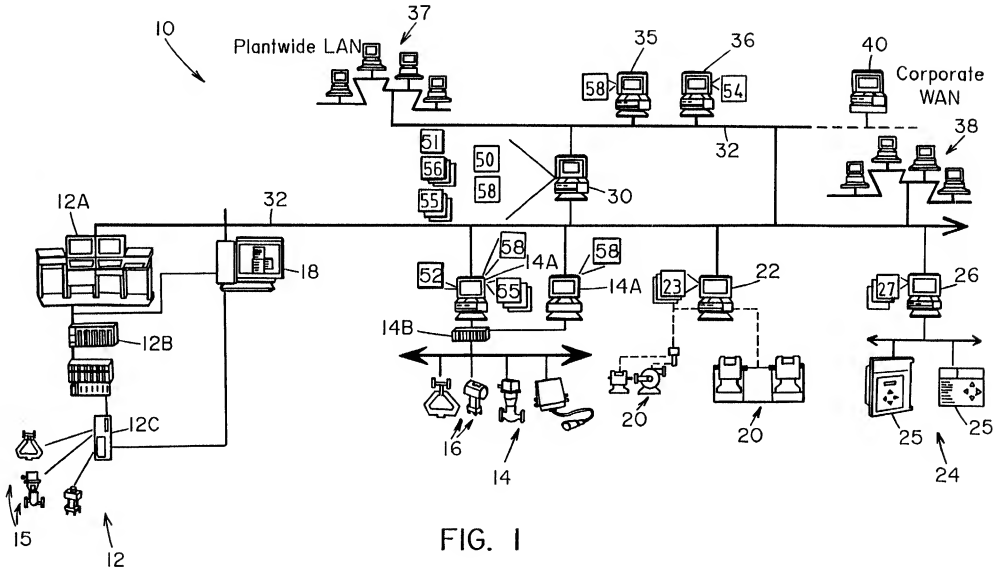


FIG. 1

FIG. 2

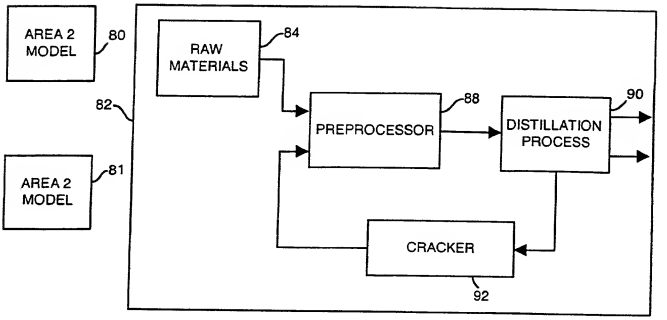

AREA 2 MODEL
80
RAW MATERIALS
84
82
PREPROCESSOR
88
DISTILLATION PROCESS
90
AREA 2 MODEL
81
CRACKER
92

FIG. 3

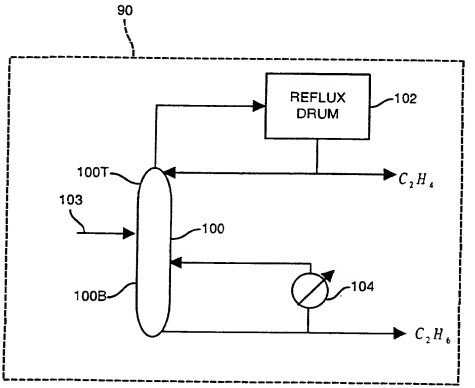

90
REFLUX DRUM
102
100T
C_2H_4
103
100
100B
104
C_2H_6

FIG. 4

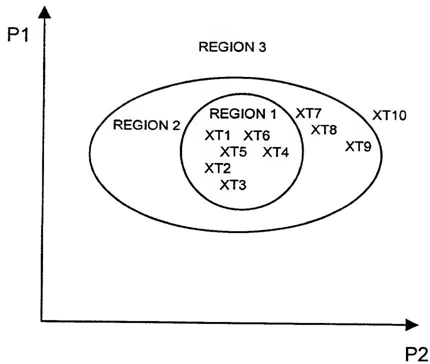

P1
REGION 3
REGION 2
REGION 1
XT7
XT10
XT8
XT1
XT6
XT9
XT5
XT4
XT2
XT3
P2

FIG. 5

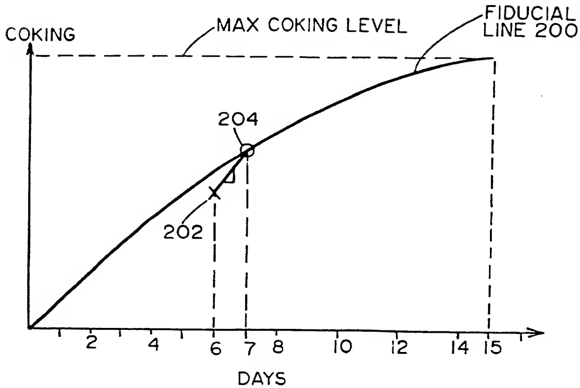

COKING
MAX COKING LEVEL
FIDUCIAL LINE 200
204
202
2
4
6
7
8
10
12
14
15
DAYS

FIG. 6

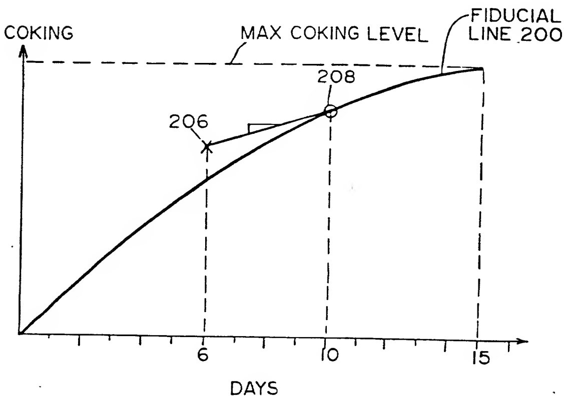

COKING
MAX COKING LEVEL
FIDUCIAL LINE 200
208
206
6
10
15
DAYS

FIG. 7

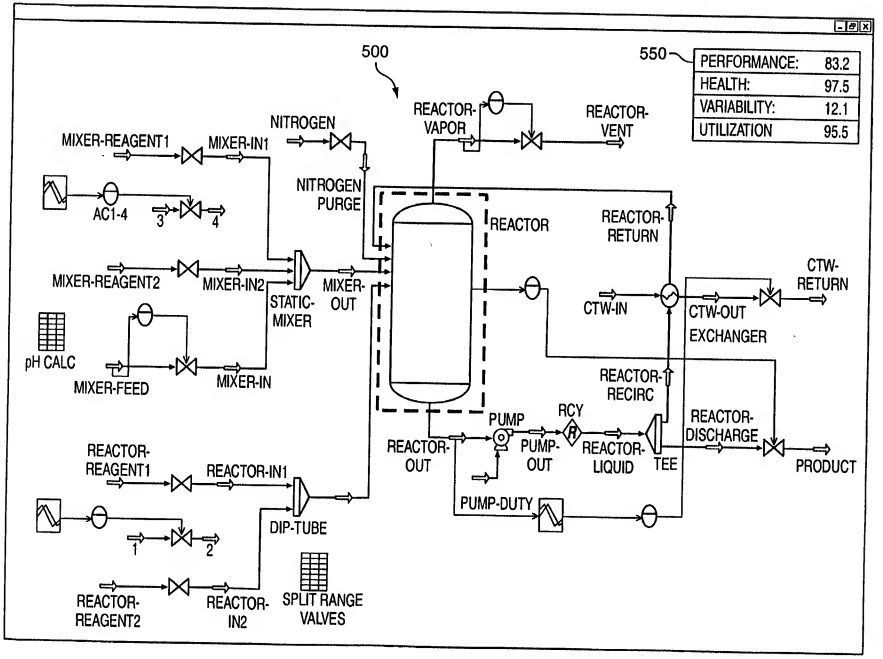


FIG. 8

	PI	VI	HI	UI
Unit	x		x	x
Sub Unit	x		x	x
Loop		x	x	x
Device		x	x	

FIG. 9

PERFORMANCE FOR FCCU: 83.2

575

Loop Name	Index	Weight
FIC-101	88	3
TIC-111	89	3
LIC-111	88	3
FIC-111	60	3
FIC-112	80	1
TCI-222	87	1
FIC-101	88	3
TIC-111	89	3
LIC-111	88	3
FIC-111	60	3
FIC-112	80	1
TIC-222	87	1
PIC-111	87	1

FIG. 10

FCCU Health: 97.5

Device Name	Index	Description	Weight
FV-111	100	Leaking	3
TI-111	98	Sticktion	3
LI-111	90	40	3
MC-101	95	Will burn up in 2 weeks	3
FV-111	96	0	1

FIG. 11

FCCU Variability: 12.1

Device Name	Index	Weight
FV-101	0	3
TI-111	2	3
LI-111	40	3
FV-111	0	3
FV-112	0	1
TI-222	2	1
FI-101	7	3
TI-111	6	3
LI-111	7	3
FI-111	7	3
FI-112	7	1
TI-222	7	1
Sub unit: Reboiler RB101	15	2

FIG. 12

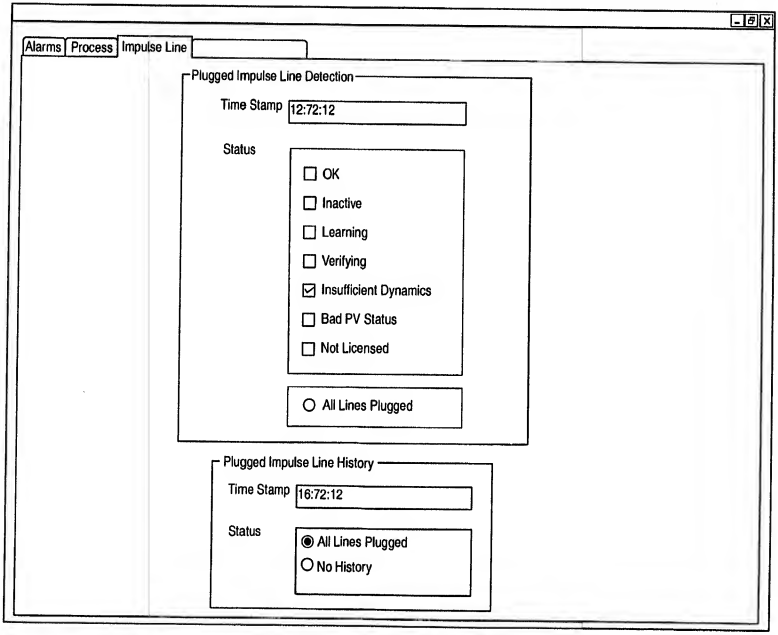


FIG. 13

Inventor(s): Eryurek, et al.
Figure No(s): 13
Sheet No.: 11 of 29

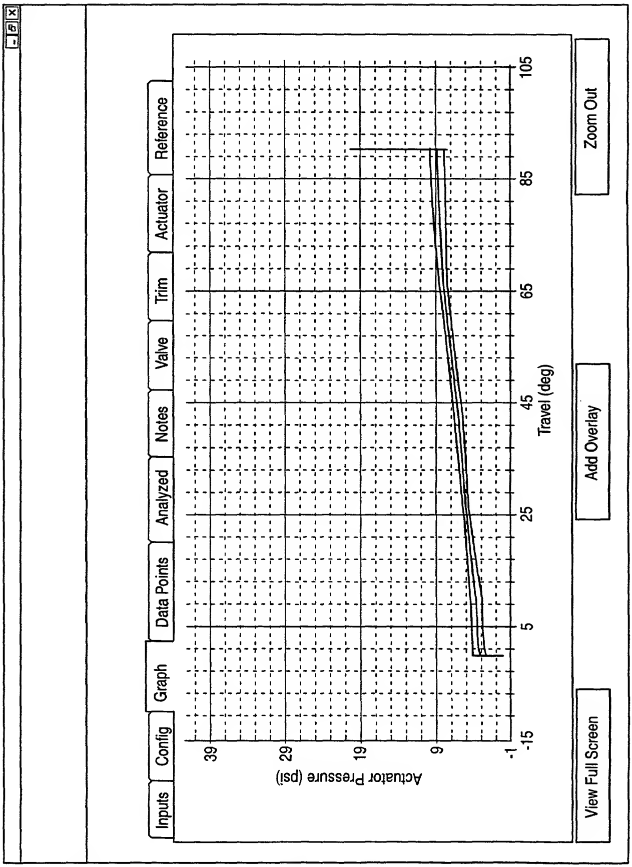

Inputs
Config
Graph
Data Points
Analyzed
Notes
Valve
Trim
Actuator
Reference
Actuator Pressure (psi)
39
29
19
9
-1
-15
5
25
45
65
85
105
Travel (deg)
View Full Screen
Add Overlay
Zoom Out

FIG. 14

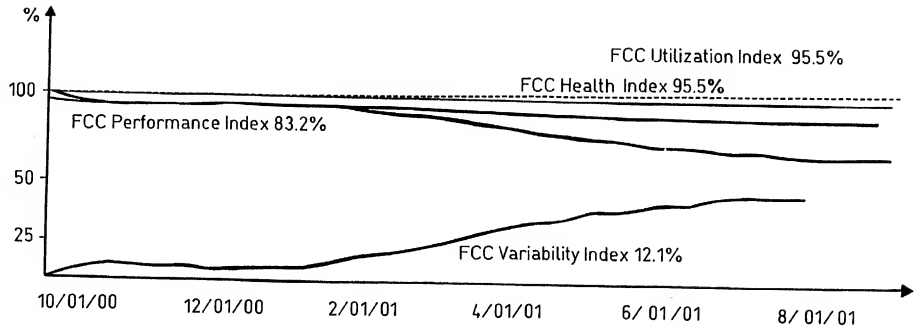


FIG. 15

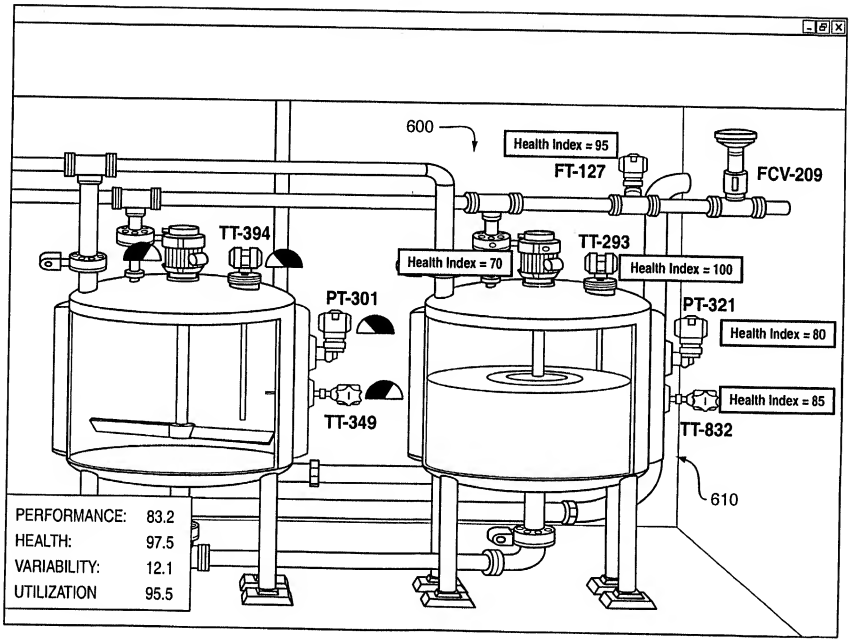


FIG. 16

Inventor(s): Eryurek, et al.
Figure No(s).: 16
Sheet No.: 14 of 29

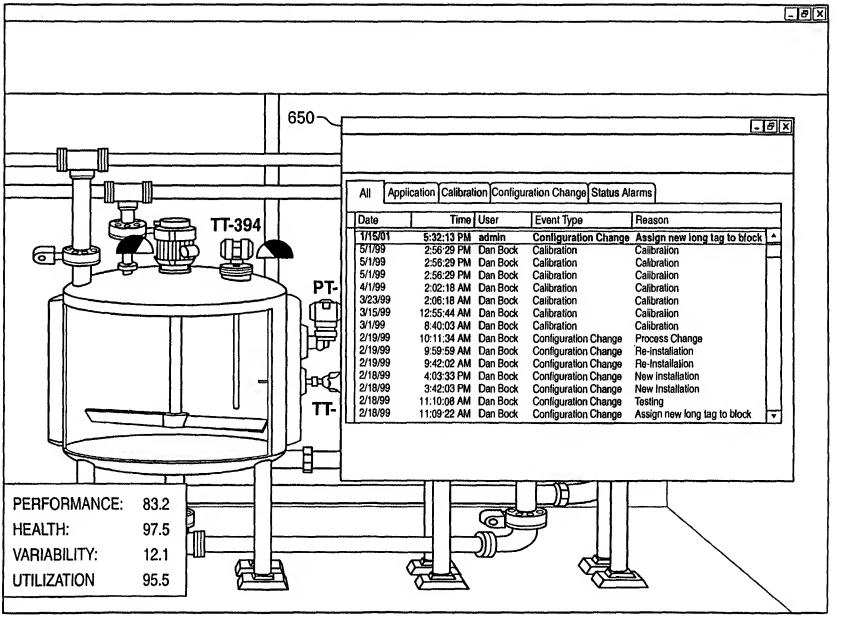


FIG. 17

Inventor(s): Eryurek, et al.
Figure No(s).: 17
Sheet No.: 15 of 29

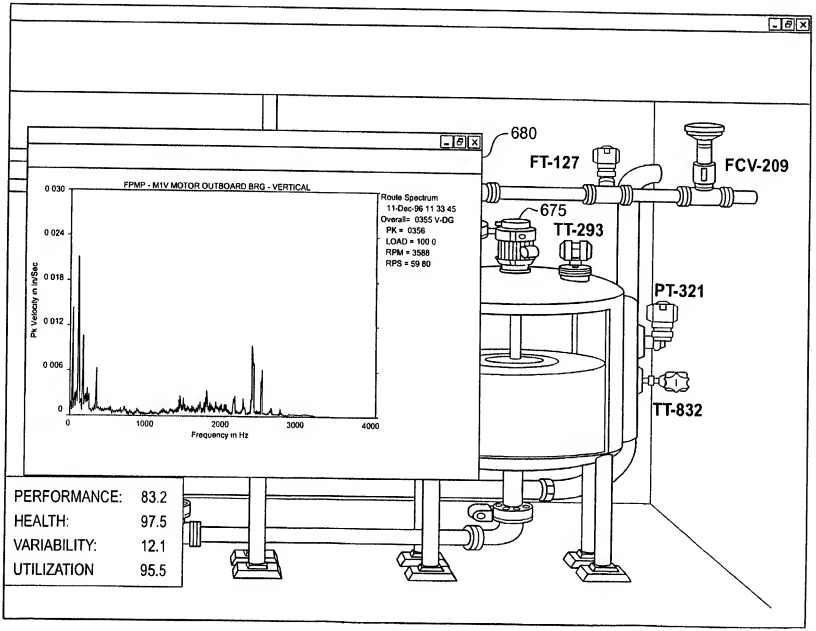


FIG. 18

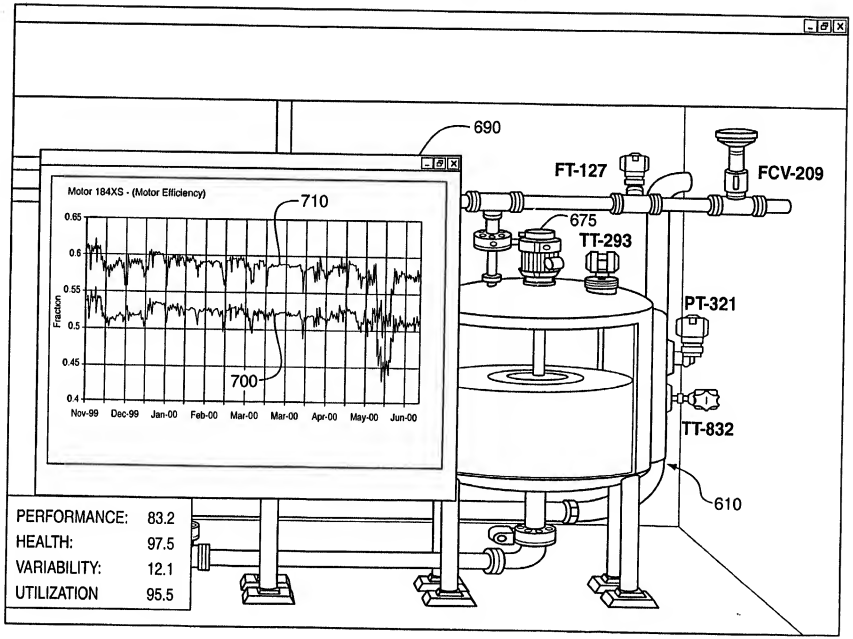

690
Motor 184XS - (Motor Efficiency)
710
700
Fraction
0.65
0.6
0.55
0.5
0.45
0.4
Nov-99
Dec-99
Jan-00
Feb-00
Mar-00
Mar-00
Apr-00
May-00
Jun-00
FT-127
FCV-209
675
TT-293
PT-321
TT-832
610
PERFORMANCE: 83.2
HEALTH: 97.5
VARIABILITY: 12.1
UTILIZATION 95.5

FIG. 19

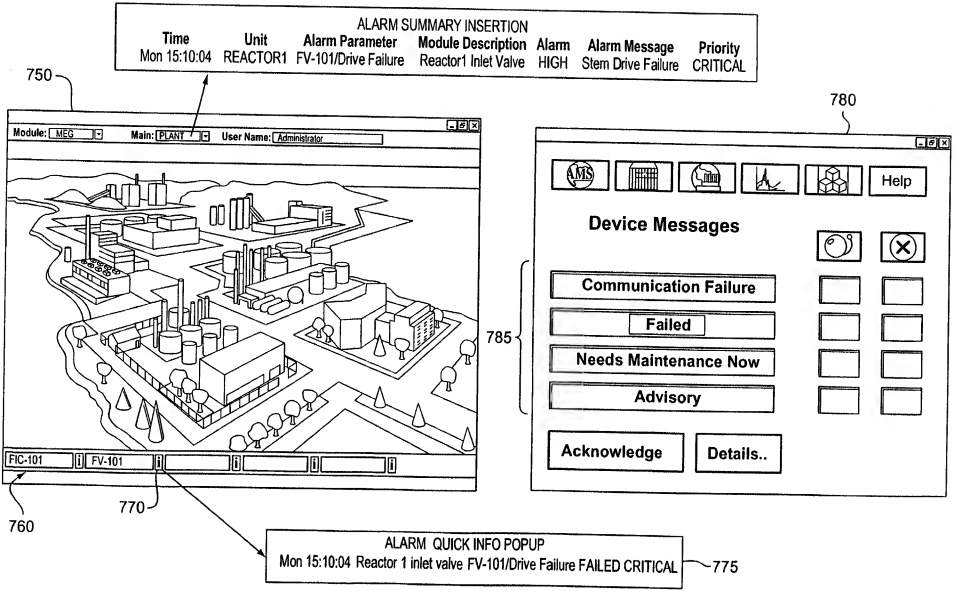

ALARM SUMMARY INSERTION
Time
Unit
Alarm Parameter
Module Description
Alarm
Alarm Message
Priority
Mon 15:10:04
REACTOR1
FV-101/Drive Failure
Reactor1 Inlet Valve
HIGH
Stem Drive Failure
CRITICAL
750
780
Module: MEG
Main: PLANT
User Name: Administrator
Help
Device Messages
Communication Failure
Failed
Needs Maintenance Now
Advisory
785
Acknowledge
Details..
FIC-101
FV-101
760
770
ALARM QUICK INFO POPUP
Mon 15:10:04 Reactor 1 inlet valve FV-101/Drive Failure FAILED CRITICAL
775

FIG. 20

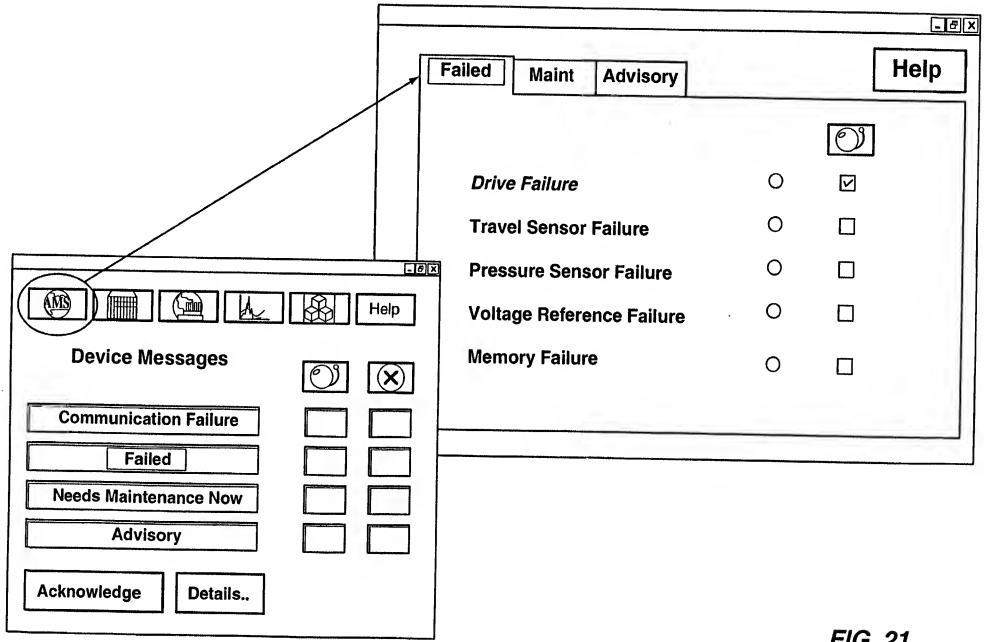


FIG. 21

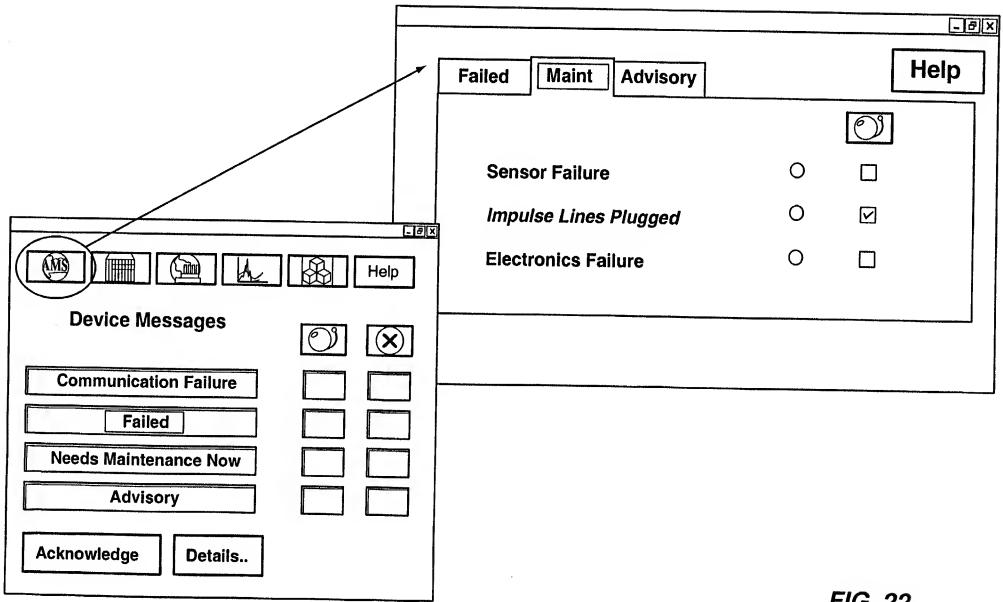


FIG. 22

Inventor(s): Eryurek, et al.
Figure No(s): 22
Sheet No.: 20 of 29

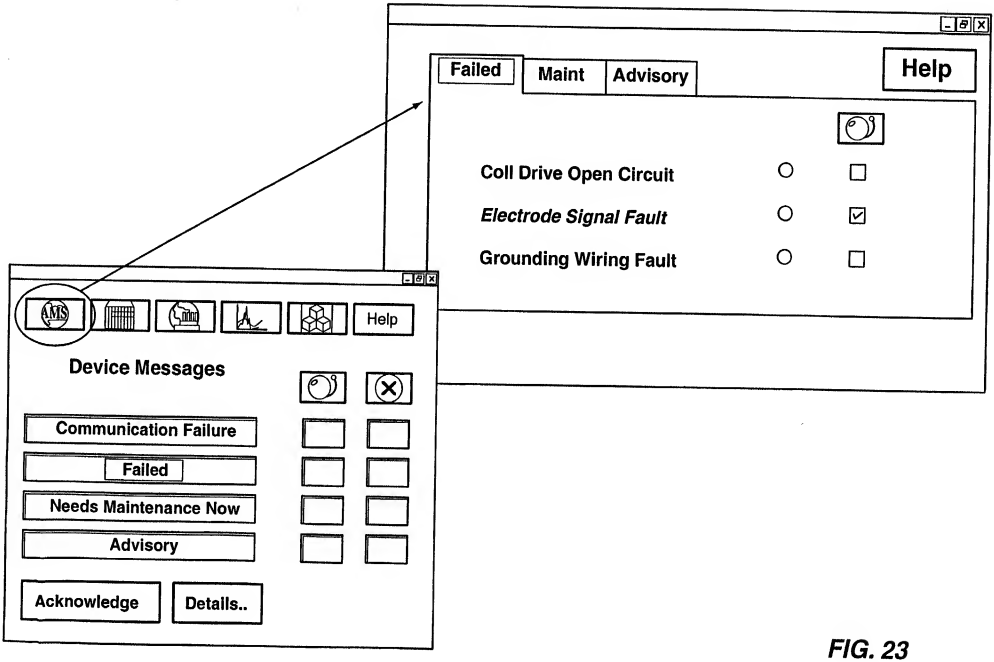
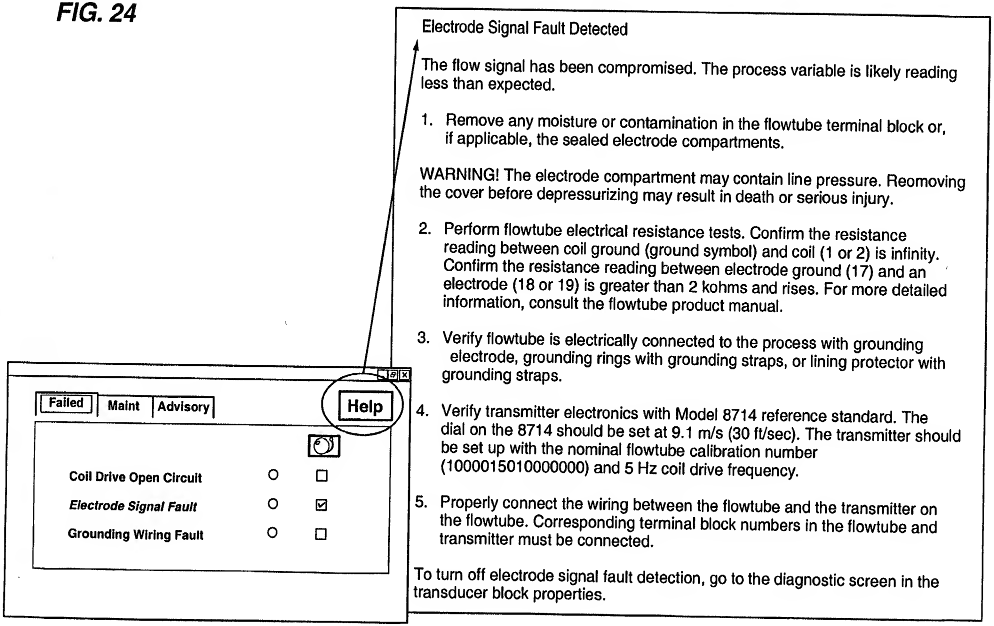


FIG. 23

Inventor(s): Eryurek, et al.
Figure No(s).: 23
Sheet No.: 21 of 29

FIG. 24


Failed
Maint
Advisory
Help
Coil Drive Open Circuit
Electrode Signal Fault
Grounding Wiring Fault
Electrode Signal Fault Detected
The flow signal has been compromised. The process variable is likely reading less than expected.
1. Remove any moisture or contamination in the flowtube terminal block or, if applicable, the sealed electrode compartments.
WARNING! The electrode compartment may contain line pressure. Reomoving the cover before depressurizing may result in death or serious injury.
2. Perform flowtube electrical resistance tests. Confirm the resistance reading between coil ground (ground symbol) and coil (1 or 2) is infinity. Confirm the resistance reading between electrode ground (17) and an electrode (18 or 19) is greater than 2 kohms and rises. For more detailed information, consult the flowtube product manual.
3. Verify flowtube is electrically connected to the process with grounding electrode, grounding rings with grounding straps, or lining protector with grounding straps.
4. Verify transmitter electronics with Model 8714 reference standard. The dial on the 8714 should be set at 9.1 m/s (30 ft/sec). The transmitter should be set up with the nominal flowtube calibration number (1000015010000000) and 5 Hz coil drive frequency.
5. Properly connect the wiring between the flowtube and the transmitter on the flowtube. Corresponding terminal block numbers in the flowtube and transmitter must be connected.
To turn off electrode signal fault detection, go to the diagnostic screen in the transducer block properties.

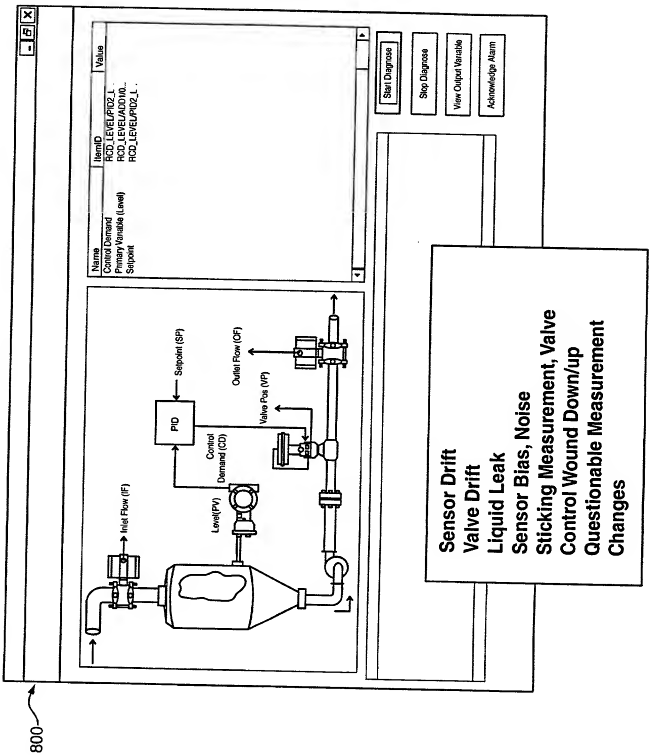

800
Name
Control Demand
Primary Variable (Level)
Setpoint
ItemID
RCD_LEVEL/PID2_L
RCD_LEVEL/ADD1/0...
RCD_LEVEL/PID2_L
Value
Start Diagnose
Stop Diagnose
View Output Variable
Acknowledge Alarm
Inlet Flow (IF)
Level(PV)
Control Demand (CD)
PID
Setpoint (SP)
Valve Pos (VP)
Outlet Flow (OF)
Sensor Drift
Valve Drift
Liquid Leak
Sensor Bias, Noise
Sticking Measurement, Valve
Control Wound Down/up
Questionable Measurement
Changes

FIG. 25

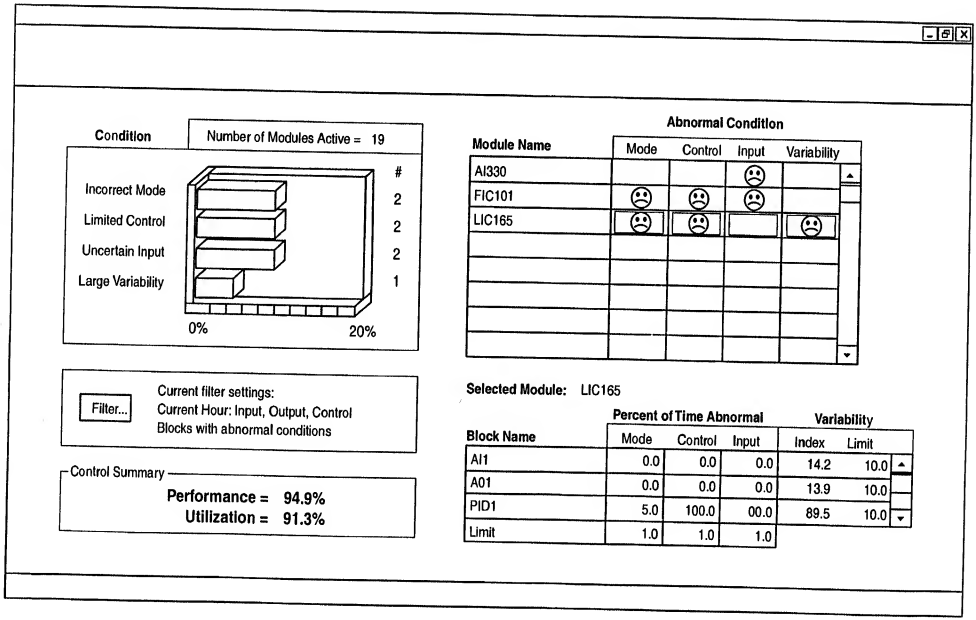

Condition
Number of Modules Active = 19
#
Incorrect Mode
2
Limited Control
2
Uncertain Input
2
Large Variability
1
0%
20%
Abnormal Condition
Module Name
Mode
Control
Input
Variability
AI330
FIC101
LIC165
Filter...
Current filter settings:
Current Hour: Input, Output, Control
Blocks with abnormal conditions
Selected Module: LIC165
Percent of Time Abnormal
Variability
Block Name
Mode
Control
Input
Index
Limit
AI1
0.0
0.0
0.0
14.2
10.0
A01
0.0
0.0
0.0
13.9
10.0
PID1
5.0
100.0
00.0
89.5
10.0
Limit
1.0
1.0
1.0
Control Summary
Performance = 94.9%
Utilization = 91.3%

FIG. 26

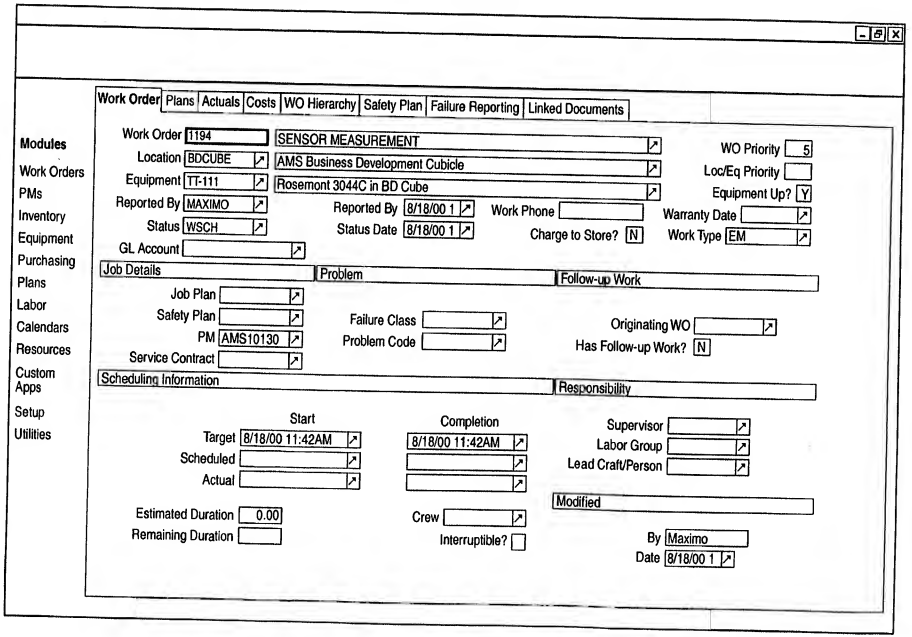


FIG. 27

Inventor(s): Eryurek, et al.
Figure No(s).: 27
Sheet No.: 25 of 29

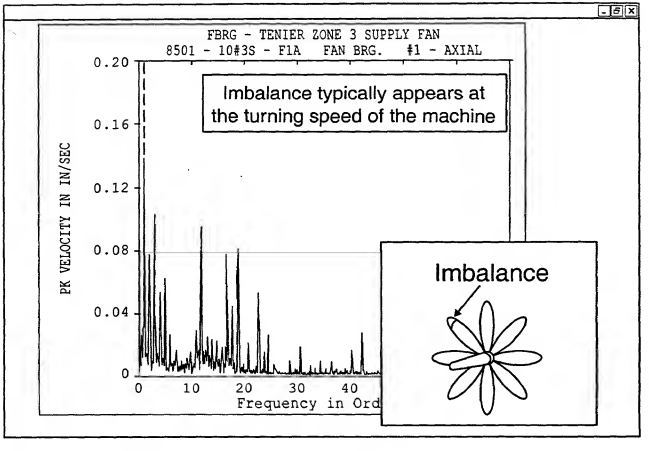


FIG. 28

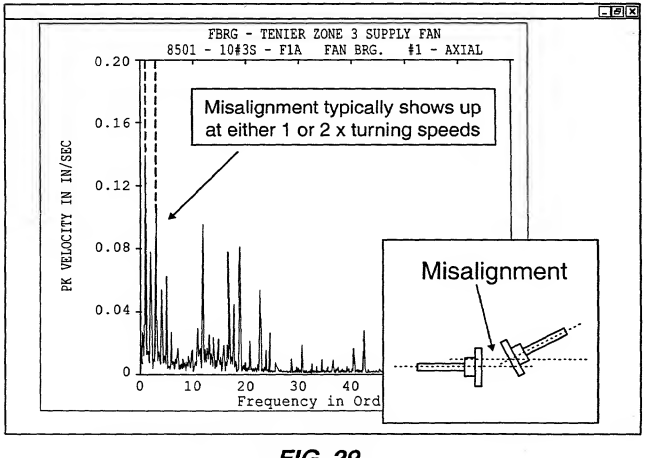


FIG. 29

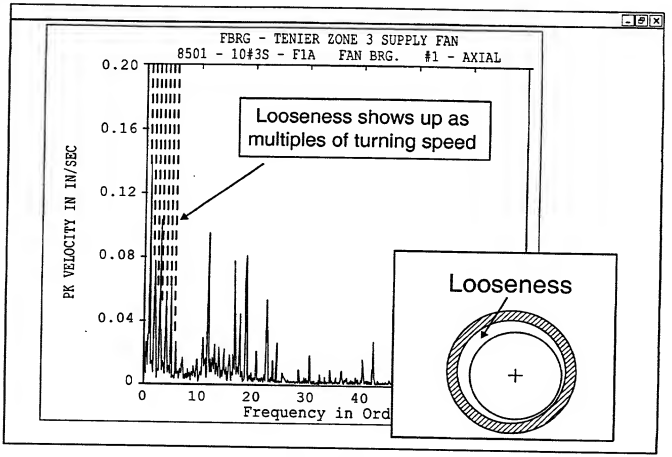

FBRG - TENIER ZONE 3 SUPPLY FAN
8501 - 10#3S - F1A FAN BRG. #1 - AXIAL
PK VELOCITY IN IN/SEC
0.20
0.16
0.12
0.08
0.04
0
0 10 20 30 40
Frequency in Ord
Looseness shows up as multiples of turning speed
Looseness

FIG. 30

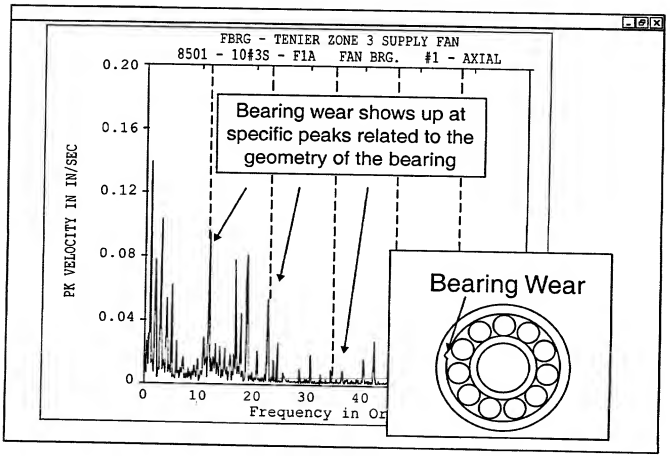

FBRG - TENIER ZONE 3 SUPPLY FAN
8501 - 10#3S - F1A FAN BRG. #1 - AXIAL
PK VELOCITY IN IN/SEC
0.20
0.16
0.12
0.08
0.04
0
0 10 20 30 40
Frequency in Or
Bearing wear shows up at specific peaks related to the geometry of the bearing
Bearing Wear

FIG. 31

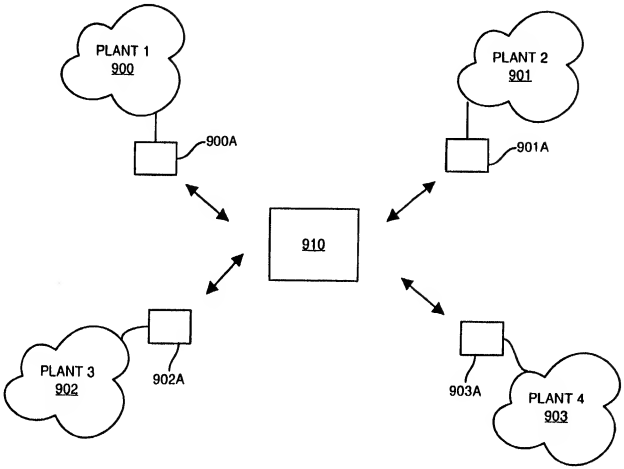


FIG. 32

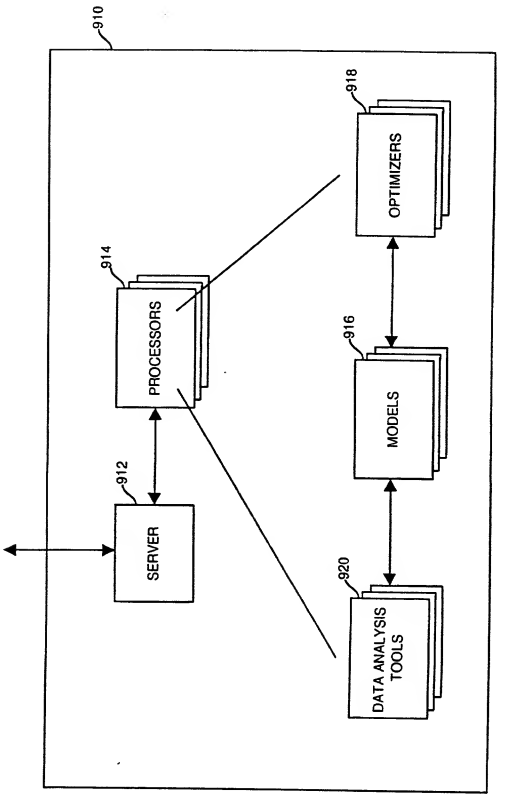

910
912
SERVER
914
PROCESSORS
916
MODELS
918
OPTIMIZERS
920
DATA ANALYSIS TOOLS

FIG. 33